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              THE MERA 400 SYSTEM.(U)
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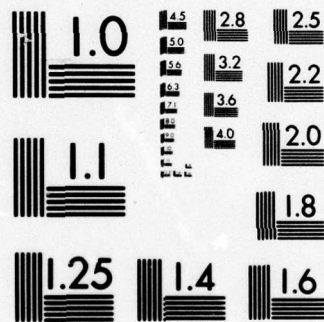
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MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS-1963-A

FTD-ID(RS)I-1407-76

FOREIGN TECHNOLOGY DIVISION

THE MERA 400 SYSTEM

EDITED TRANSLATION

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THE MERA 400 SYSTEM

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THE MERA 400 SYSTEM

The MERA 400 minicomputer is a universal 16-bit digital computer with logical structure meeting requirements set for present-day digital systems, both in terms of logical structure and technical solutions.

The flexibility of the functional structure of the mini-computer is obtained through the use of a standard interface connecting the processors, channels, and internal memory as well as the use of a base of asynchronous operation of these modules. A developed list of instructions ensures effective operations on data having different forms.

High reliability of operation of the minicomputer is ensured by its technical execution; integrated elements with an intermediate level of integration are installed on two-sided packets. The mechanical structure ensures simple installation of functional units and a suitable selection of peripheral equipment not requiring air conditioning.

Free and rapid access to all functional modules, suitable testing equipment, together with testing programs ensure efficient operation and technical servicing of the system.

Programming, and especially the languages FORTRAN IV, BASIC, MOST, and CEMMA which are supported by a vast library of numerical programs offered with reliable equipment, give users convenient and reliable equipment for various applications of computers.

Pamięć (1)
operacyjna
Blok systemowy
8 K

Pamięć (8)
operacyjna
Blok użytkowy
24 K

interfejs (14)

Kanał (2)
selektorowy
bezpośredniego
dostępu

Centralna (6)
jednostka
przetwarzająca

Kanał (9)
znakowy
programowany

Kontroler dyskowy (3)

Pam.dyskowa (4)
MERA 9425

Pam.dyskowa (5)
MERA 9425

Pulpit (7)
techniczny

Jedn.sterująca
monitorem
systemowym (10)
DZM-180 KSR

Monitor (15)
systemowy
DZM-180 KSR

Jedn.sterująca
czytnikiem
CT 1001 (11)

Czytnik (16)
CT 1001

Jedn.sterująca
dziurkarką (12)
DT 105

Dziurkarka
DT 105 (17)

Jedn.sterująca
drukarką
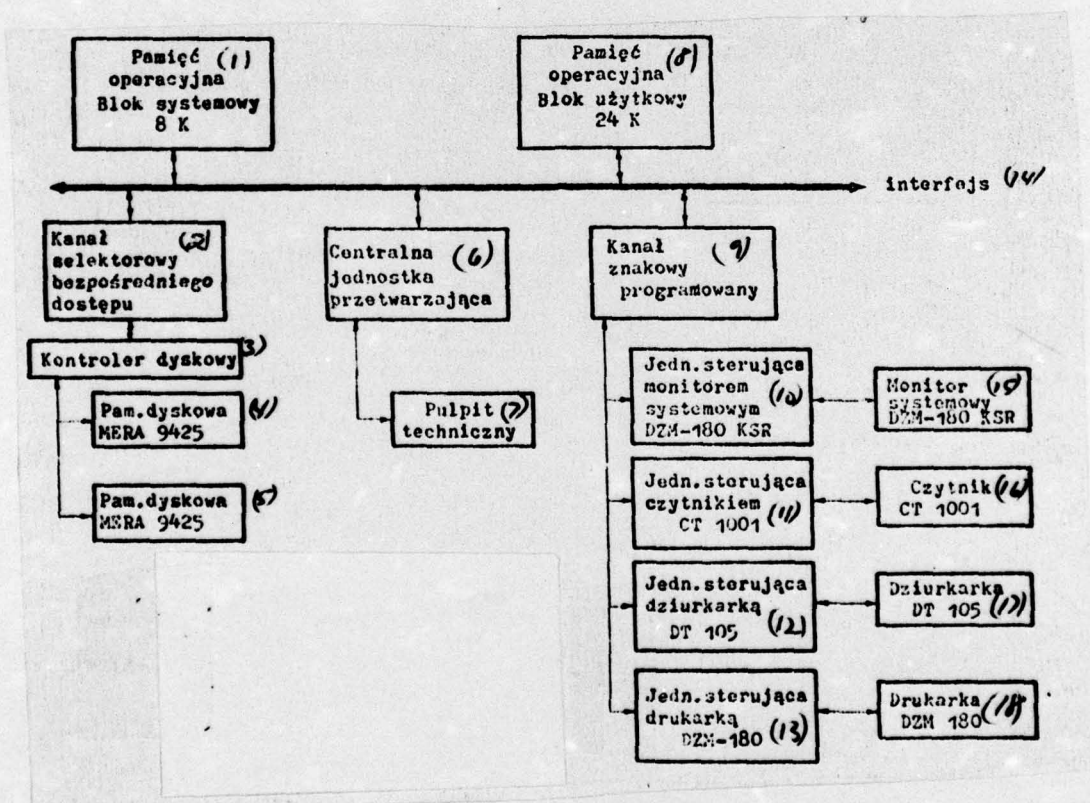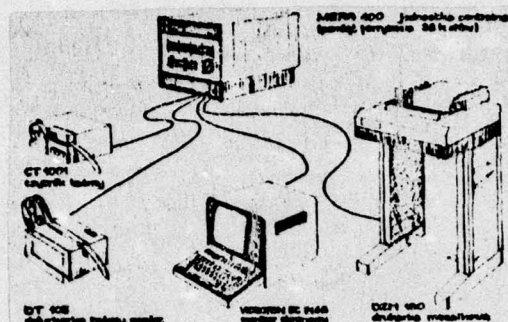DZM-180 (13)

Drukarka
DZM 180 (18)

Figure. Key: (1) internal storage, system block 8K; (2) direct access selector channel; (3) disc controller; (4) MERA 9425 disc memory; (5) MERA 9425 disc memory; (6) central processing unit; (7) control panel; (8) internal storage, use block 24 K; (9) program symbol channel; (10) DZM-180 KSR system monitor control unit; (11) CT 1001 reader control unit; (12)DT-105 punch control unit; (13) DZM-180 printer control unit; (14) interface; (15) DZM-180 KSR system monitor; (16) CT 1001 reader; (17) DT 105 punch; (18) DZM 180 printer

GENERAL CHARACTERISTICS

Applications

    scientific and engineering calculations

    processing of economic and administrative data

    automatic control of engineering operations

    processing in real time

    collection of data

    process control

    remote batch processing

    remote access

EQUIPMENT CHARACTERISTICS

Central processing unit

    word length 16 bits

    6 16-bit universal registers

    32-bit breakdown announcing register

    breakdown masking on 10 service levels

    equipment organization of pile breakdown

    automatic bootstrapping

    alarm feed system and automatic program restart

    120 instructions including

        bootstrapping and memory instructions

        instructions for operations on short fixed decimal numbers

        logical operation instructions

        byte operation instructions

        comparison instructions

shift instructions

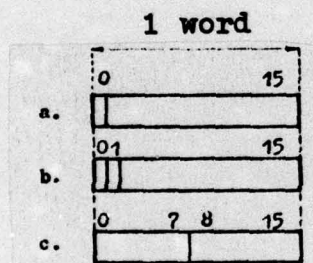jump instructions

testing and branching instructions

input-output instructions

instructions for arithmetic operations on long fixed

decimal numbers and variable decimal numbers (extra-code

realization)

complemented binary arithmetic

information form

1 word

```
        0            15
a.  [              ]
      01           15
b.  [||            ]
      0      7  8   15
c.  [       |       ]
```

a) short fixed decimal number

position $\emptyset$-number symbol

positions 1+15-number complement

b) logical information
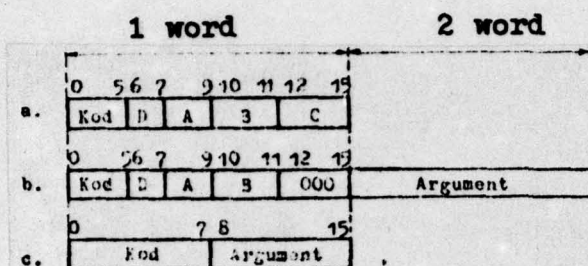
positions 0+15-series of independent bits

c) alphanumeric information

positions $\emptyset$+7-alphanumeric symbol 1

positions 8+15-alphanumeric symbol 2

form of instructions:

```
            1 word            2 word
      |0   5 6 7   9 10 11 12  15|
  a.  |Kod |D |A |3 |  C  |
      |0   5 6 7   9 10 11 12  15|
  b.  |Kod |D |A |3 | 000 |    Argument
      |0          7 8      15|
  c.  |   Kod   |  Argument  |   .
```

a) basic form of instructions

    position 0+5   instruction code

    position 6   intermediate argument bit
                                   (D-modification) *sign of the argument of the instruction.*
                                   continuation of construction code.

    positions 7+9   number of universal register
                                   continuation of instruction code

    positions 10+12   number of index register
                                   (B-modification)
                                   continuation of instruction code

    positions 13+15   indicate instruction argument

                                   continuation of instruction code

b) instruction with direct argument occupying word following

    basic word of instruction

c) instructions with direct byte argument

    positions 0+7   instruction code

    positions 8+15   direct argument of instruction

three types of instruction modification:

    premodification (using special instruction)

    B-modification

    D-modification

time for performing basic instructions

    jump instructions   1.3 µs

    register-register instructions   1.3 µs

arithmetic operation instructions   1.5 μs

premodification increases performance time of instruction

by 300 ns

B-modification extends it by 300 ns

D-modification extends it by 660 ns

Internal storage

capacity: maximum of 17 blocks each with 4K to 32K

16-bit words

direct addressing: 32K words

program division of internal storage

storage on ferrite cores or thin cylindrical magnetic

layers

cycle time: 700 ns

Channels

symbol channel for eight units which control external

equipment

selector channel for eight units which control external

storage

External equipment

monitor for system: symbol-mosaic printer with DZM-180 KSR

keyboard

specifications:

printing speed   180 symbols/s

number of symbols/line   133 or 158

symbol density   10 or 12/inch

paper width   4...14.5 inches

6

symbol code   ISO 7

number of different symbols   64

speed of paper movement   10 lines/s

environment temperature   +5° ... +40°

printer power   220V, 50Hz

power input through printer   250 VA

high-speed CT 1001 paper tape reader

    maximum data input speed 1000 symbols/s, start-stop

    tape movement

high-speed DT-105 paper tape punch

    maximum speed of punching 150 symbols/sec

DZM-180 symbol-mosaic printer

    maximum printing speed 180 symbols/s

    number of symbols in a line 133 or 158

    ISO 7 code

EC 7168 alphanumeric screen monitor (user option)

    screen diagonal   28 cm

    number of lines   16

    number of symbols per line   80

    code   ISO 7

    interface   V24 wg CCITT

                                    150-1200

    editing possibilities   tabulation

                                    margins retained

    erasing of symbol, line, screen

    change in symbol, line

    marker shift

7

External storage (user option)

    MERA 9425 disc memory

        50 M bit capacity

        two discs: fixed and variable

        speed: 156,000 16-bit words/s

        average access time 35 ms

Mechanical structure

    dimensions 445 x 530 x 564

    weight 45 kg

    frame welded construction; metal removable housing

    equipment: technical panel, chassis with caset with maximum

    content of 32 packets, feeder

    sloped panel ensuring access to chassis and feeder

    exhaust ventilation independent of casette and chassis

    packet with dimensions 300 x 300 mm, two-side print,

    medium scale integration integrated units, chassis mounted

    by conductor winding method

power

    single phase grid 220V+10%-15% 50 Hz

    power input: 1.5 kVA

    automated devices ensuring protection of internal storage

    when turning voltage on and off

    protection of units of central processing unit with voltage

    increases and temperature overload

    drawer construction

    voltage source stabilization: +5V, +14V, +30V, -5V, -6V, -12V

Operating conditions

       operating temperature $+5^{\circ}C-40^{\circ}C$

       Relative humidity 95% at a temperature of $30^{\circ}C$

       vibration resistance: amplitude 0.15 mm in a range 10-60 Hz,

       acceleration 2 g in the range 60-150 Hz

       thermal resistance $-40-+55^{\circ}C$

PROGRAMMING

       SOM-1 single program operating system with conversational
operational language; contains broad sets of directives and
extra-codes

       loading and starting program directives

       debugging directives

       input/output extra-codes

       number conversion extra-codes

       extra-codes for basic complete and variable-decimal arithmetic
functions

       MASS basic assembler

       FORTRAN IV-language designed mainly for scientific and
engineering calculations, permits writing of large, composit
programs intended for engineering calculations

       BASIC-conversational language designed for engineering
computations; used in design bureaus

       MOST-400-automatic programming language; designed primarily
for programming scientific and engineering computations;
MOST has a symbolism somewhat like that of mathematics
and is designed for the description of such computations

as the solution of quadratic equations, integrals, matrices, etc.

CEMMA-special problem oriented language designed for automation engineers; used for simulation and modeling on a digital computer continuous processes with control and regulation of classical automatic equipment

CSL-language for modelling and sumulation taking into accountreal time of industrial processes, financial systems, management, marketing, etc.; permits use of information with charaateristics of a simulated process without activating it and performing experiments on it.

Library of numerical programs including about 80 programs from statistics, integral and differential calculus, algebra, analytic functions, optimalization problems, linear programming, etc.

Developed by MERA Institute of Mathematical Machines Microcomputer Experimental Plant

Produced by MERA-ZSM Zaklady Systemow Minikomputerowych (Mini-computer systems) 02-232 Warszawa, ul. Lopuszanska 117/123; telephone 23-70-44, telex 81 36 17

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09

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